

Evaluation of Application of the IPM action plan in GEM _ CC

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1. ABSTRACT

Antiquities all over the world are very important because they act like a window on the civilizations of the past, Egyptian antiquities particularly are the most characteristic cultural heritages in the world; therefore we must preserve and guard them against any risk.

One of the main risks is the biological damage which caused by pests especially insect pests. The Integrated pest management (IPM) is a project applied in different museums that aims to protect their collections from pests taking in consideration the effect of pests on human and the environment. IPM system has various applications in museums in different countries according to various surrounded circumstances and nature of historical collections.

First of all GEM-CC is a facility which contains a large amount archaeological objects and locates in a desert area which increases the percentage of insect pests' existence. Based on the foregoing we started to set an action plan for implementing the IPM project inside GEM-CC without using any chemicals in collaboration with Japan International Cooperation Agency (JICA) which supported the project with all the required tools and materials to keep it and its archaeological collections safe from the microbiological attacks. The plan was started by dividing GEM-CC into three main areas. The goal of this step is to compare between these different areas as each area has its own weather conditions, taking in consideration that the storage area is the most important one and has a priority of application of this action plan. Implementing the IPM plan by performing several steps such as closing gaps , cracks, prevention the usage of insect attractors and removing plants in order to obtain a complete blocking of insects. Collecting and analyzing data was important after application of the action plan to make a survey on Laboratories area and storages area. We chose to compare the results of the months April, Mai, June, July, August and September for the both years 2011 and 2012 because there is a state of increasing in the number of insects due to several factors, the comparison proved that the total number of all insects and total number of harmful insects on artifacts were decreased clearly in 2012 after application of the agreed action plan especially in storage area. IPM team was succeeded in reducing and controlling the insect pests in the GEM - CC , so they are on their right way to make it the green museum.

2. INTRODUCTION

The Grand Egyptian Museum – Conservation Center has a large amount of antiquities which we have to preserve and guard them against any risk. One of the important risks is the biological damage which is caused by pests that include Insect pests and Microorganisms (bacteria – fungi), specially insect pests. GEM – CC is located in a desert area which can increase the percentage of insect pests existence; therefore there is a group in GEM – CC which is responsible for insect pests control called IPM group at (Anoxia Lab or fumigation using inert gaseous as N2 gas).

This group noticed that the CC has a large number of insects found in traps, so they made a well planned program and take in consideration that it should be relevant to the needs of the museum building and the collections and determine the budget for the project and program priorities. A preliminary action plan has been developed in 2010 at GEM-CC. It included distribution and collecting traps monthly, identification, classification and making a survey for the insects that were found inside traps. Not only adult insects are found but also other development stages as larvae, pupa and nymph of insects. As a sample of identified and classified adult insect; *Booklice* (figure 1) which has incomplete life cycle, feed on glue materials so it is considered as a harmful pest for artifacts as it attacks books and manuscripts. *Drain Fly* (figure 2) is another example for identified flying insects which is considered as an environmental indicator due to its presence in humid places.



(Figure 1)



(Figure 2)

In 2011 there was an advanced action plan has been developed to decrease the number of insects existed in GEM-CC. This paper focuses on the laboratories area (B) and the storages area (C) as they contain a large number of artifacts. We made a comparison between 2011 and 2012 especially in April, May, June, July, August, September months not for winter season due to hibernation of insects. The chosen months show a state of increase in the number of insects because in spring season is the mating season and laying eggs and in summer season there is a distinct increase in temperature leading to complete life cycle in shorter period and the warmer climate also causes acceleration for producing more generations. So the temperature has a distinct effect on the insect life cycle and generation number produced.

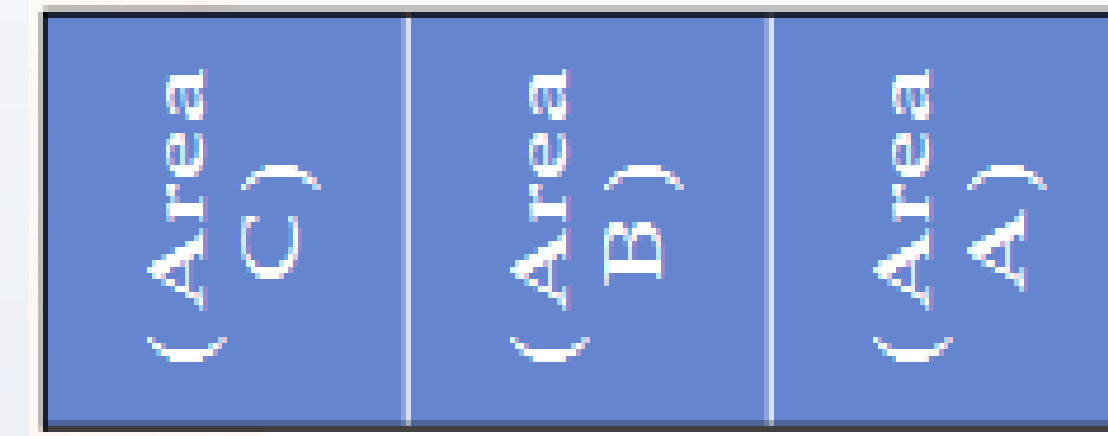
3. METHODS and MATERIALS

3.1. Materials:

Stereo microscope with max. Magnification 94 x, Sticky traps, Rubber, Thick brushes, Aluminum sheets, Aluminum taps, Optron traps and Sticky mats.

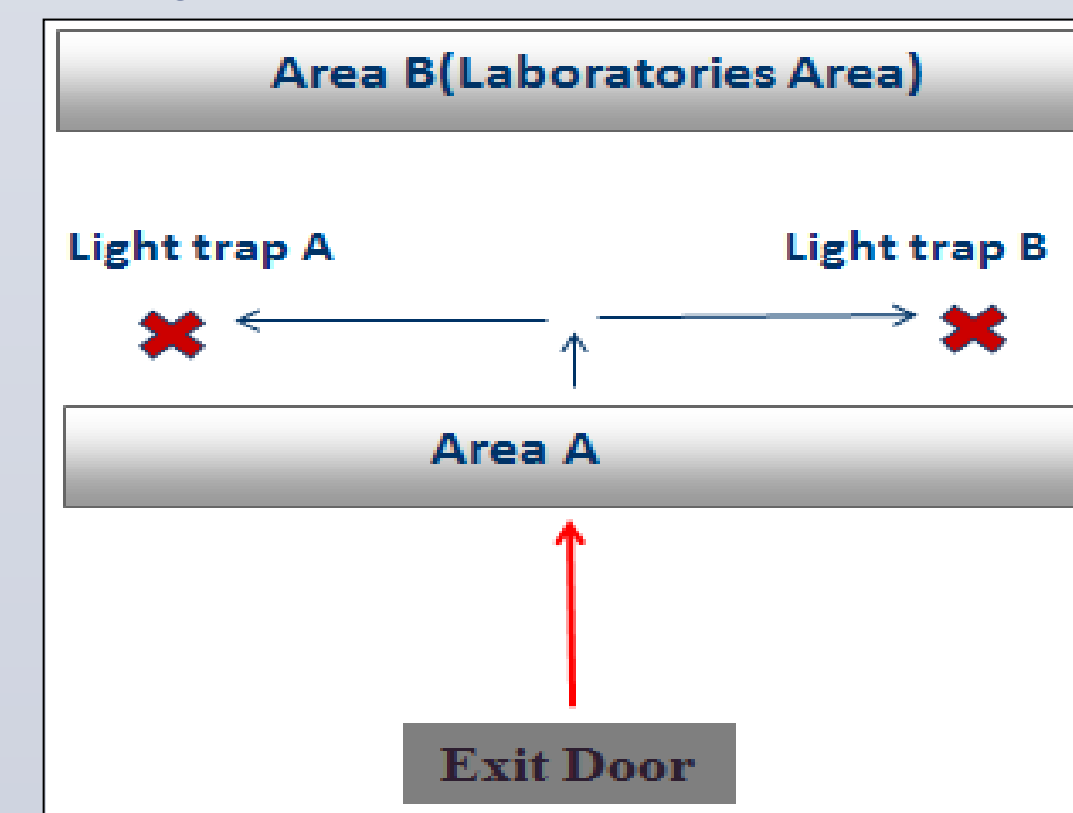
3.2. Methods:

The action plan began with dividing conservation center into three areas (A&B&C) as in figure (3). We used sticky traps which is the most preferred to be used in museums. We distribute and collect these traps monthly according to the drawn maps for each laboratory and storage room in CC for perfect monitoring which display the number and place each trap.



(Figure 3)

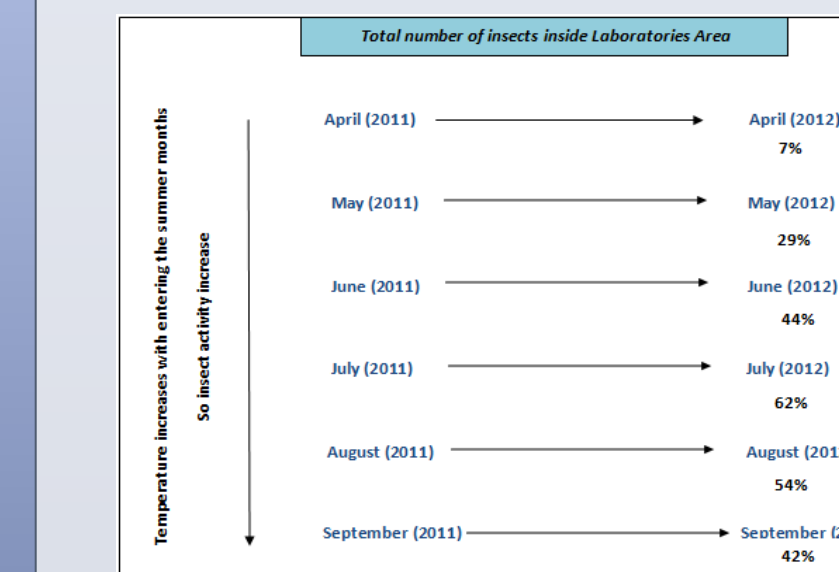
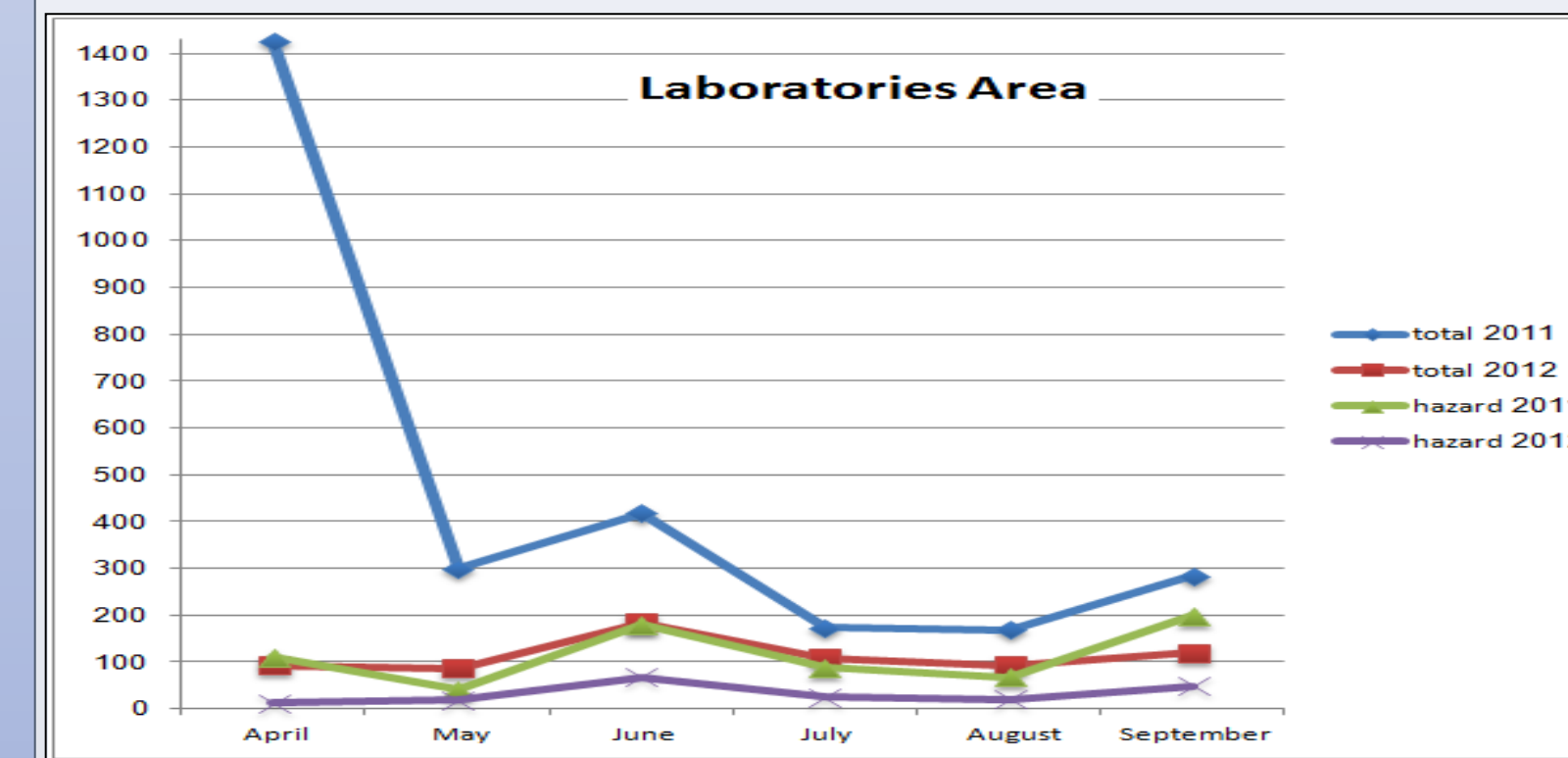
But we noticed that the places of traps are changed when compared with the drawn maps. So we wrote a warning signs on traps "Don't touch" in two languages (Arabic - English) and met with the Hygiene officials to increase the awareness against moving them. Then we fixed the number and place of traps in each Laboratory or storage room. We noticed a large number of insects in traps beside the plants. After inspection of these plants, we found that the soil of the plants is filled with different types of insects. Therefore we removed all plants immediately from corridors. Traps beside doors have the same problem. This is may be because of leaving doors opened for a long time. So we increase the awareness of the staff to keep doors closed. And put sticky mats to decrease the amount of dust enters the place which may be a reason of increasing the existence of insects. But the number of insects is still large. Therefore the IPM team discussed the problem and made a study to know the reasons of insect existence and how to solve it. The reasons were confined in the following: Sanitation problems, distance between doors and the ground, cracks and gaps. Then we solved these problems by closing drain holes using aluminum taps, check the regular cleaning for both laboratories, storage rooms, corridors and dark hidden places and putting extra sticky mats in new places for super blocking. Filling all cracks and gaps found on walls or the ground. Also filling the distance between doors and the ground using aluminum sheets and rubber. Application of Ultra Violet (UV) light traps for trapping flying insects found in conservation center was on a scientific basis Using UV light traps with glue boards was preferred than zapping UV light traps.



(Figure 4)

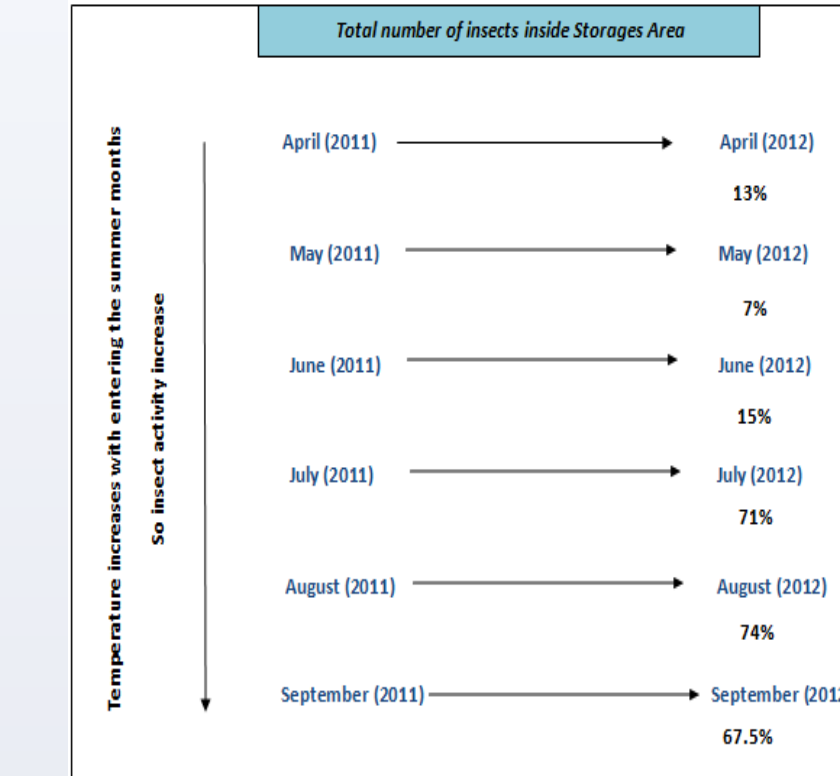
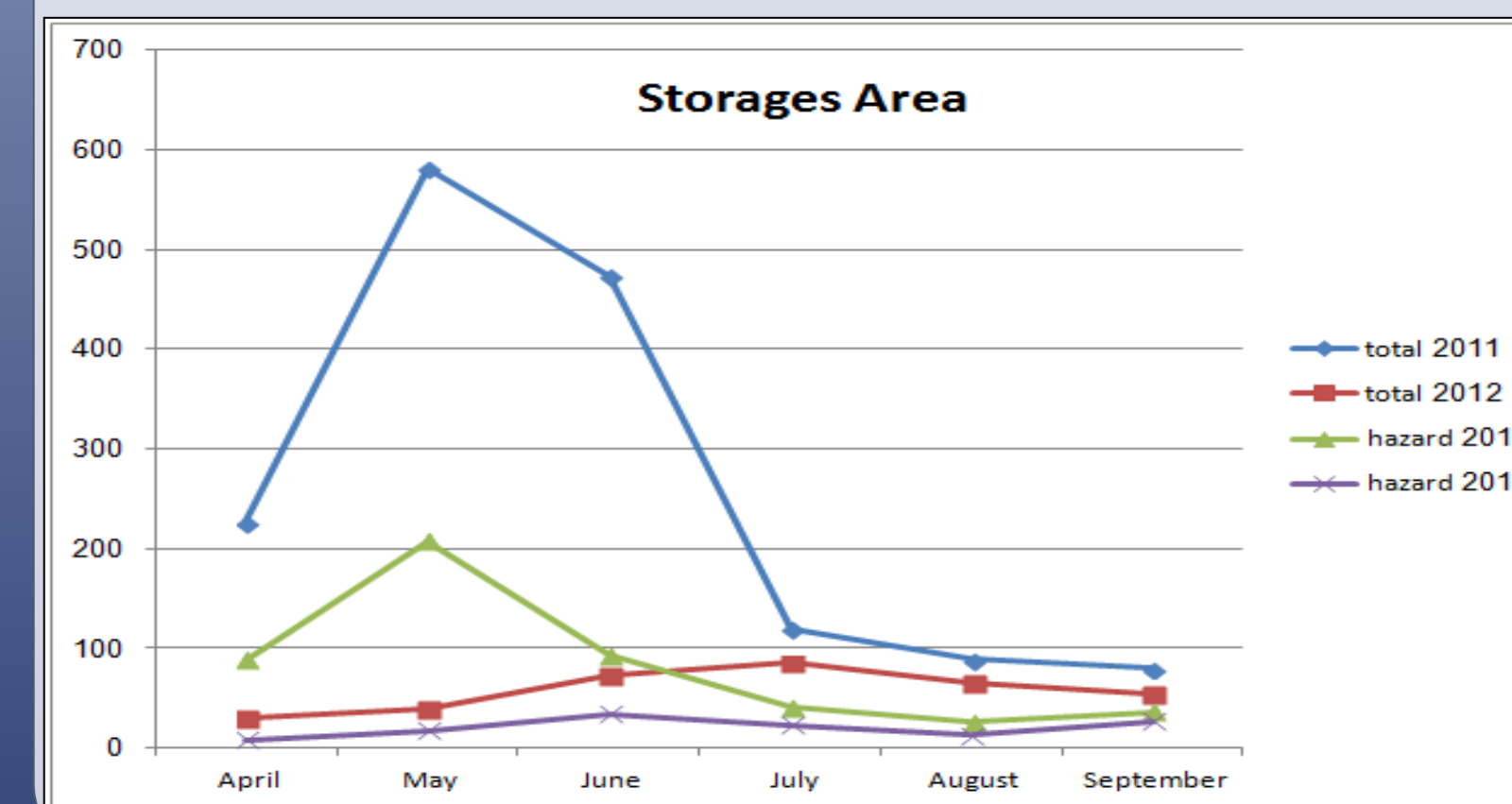
The places of UV light traps were chosen to be away from collections (figure 4) because UV lights must not Shine directly on collections. To make sure, reading of UV light inside and outside laboratories were taken. This help in trapping all flying insects before going inside the laboratories. Implementation of the Action Plan was initiated within the storages area, because they have the priority due to the presence of a large number of Egyptian antiquities inside .

4. RESULTS



(Figure 5) shows the decrease in the total no. of insects & total no. of hazard insects during selected months in 2011-2012 in the laboratories area (B).

After application of the action plan there was a noticeable decrease in the total number of all insects and also in the total number of hazard insects from 2011 to 2012 during the chosen months taking in consideration the insect activity in Laboratories & Storages areas..



(Figure 6) shows the decrease in the total no. of insects & total no. of hazard insects during selected months in 2011-2012 in the storages area (C).

5. CONCLUSION

After application of the action plan there was a noticeable decrease in the total number of all insects from 2011 to 2012 especially in May and June 2012 and also in the total number of hazard insects from 2011 to 2012 especially in May 2012. With comparing the results between the chosen months during the two years taking in consideration the insect activity, suppose that the percentage of the presence of insects inside the conservation center during April 2011 was 100%, we will see that this ratio reached to 13% during the same month of 2012 after the application of the IPM action plan then reached to 7 % in May 2012, 15% in June 2012 and so on. IPM group is seeking to keep the insects away from GEM-CC to preserve the artifacts from the damage caused by insects as possible as we can using advanced methods. Being updated with new information, methods and new IPM strategies applied in museums all over the world.

6. REFERENCES

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- Australian/New Zealand Standard 4360:1995. Risk Management. Homebush NSW and Wellington, NZ: Standards Australia and Standards New Zealand. Appendix B: Steps in Developing and Implementing